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# T-S Horizons

Affordable Quality for the Timex Computer User  
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	4	FORMAT	SIZE*	1X	2X
ENTER - Rumors & Gossip	6	Full page	6-1/4 x 9	\$125	\$119
Guest EDITorial by Eben Brown	8	2/3 page	4-1/2 x 9	100	95
TS 2068 Program Tips		1/2 page	6-1/4 x 4-1/2	75	71
by Marty Dubay			3 x 9		
TS 2068 Rotating Globe Routine	10	1/3 page	4-1/2 x 4-1/2	65	62
by Mihaly Grell			2 x 9		
TS 1000 Bank Switching-IV	12	1/4 page	3 x 4-1/2	35	33
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Byte Back Modem Review	23	may be reproduced from an ad in an-			
"In Touch with the World"		other publication.			
by Bill Ferrebee	24	CLOSING DATES: 15th of month pre-			
Reviews for the Non-Programmer		ceding issue date.			
by Art Ginden	26	FREQUENCY: Monthly.			

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# ENTER

Unfortunately, this issue of T-S Horizons is late, thus the July/August cover. Of course T-S Horizons is intended to be published monthly. We hope this will be the last time that we have to "double up" for an issue. And all of you who are subscribers rest assured that our \$12 subscription rate is for 12 issues. Similarly if you signed up for a half-year subscription you will still receive 6 issues - no matter what the cover date is!

## Westridge President Dies

We recently learned that Stuart Lotwin, the founder of the company that makes the Westridge 2050 modem for the TS1000 and TS2068 died suddenly a few weeks ago. We understand that there may be some delays but his widow and his associates will continue on with the modem and all company products. We extend our sympathy to the family of this man who has helped many Timex users.

## Rumors and Gossip

As Larry Norman said in one of his songs "Spreading rumors and gossip is a real bad game..." But it's hard to ignore some of the rumors we've been hearing lately.

1. First of all, the Dave Higgenbottom story. Dave has been the source of many rumors in the Timex camp, and a news item published in Infoworld magazine. We have a transcript of an interview with him that is ready for publication. It was originally intended for this issue. However, we have recently been advised by some individuals (one at Timex) to hold off on the interview. For the moment we'd just like to say, we wish the best for Dave and his plans to resurrect the Timex Computer line.

Dave Higgenbottom can be reached at 10614 Rosecrans Ave., Santa Fe Springs, CA 90670. (213) 864-7068.

2. Timex has disconnected their 800 number. All of the merchandise in their warehouse has been sold to the Closeout Corporation in New York City. Currently Closeout is trying to determine what to do with the stuff.

3. E. Arthur Brown reports that Sinclair is preparing to introduce the ZX81 and Spectrum computers into the U.S. market this fall when they begin U.S. distribution of the new Quantum Leap (QL). The ZX81 and Spectrum computers are now being made in S. Korea by Samsung Electronics. Apparently Korean regulations are based on F.C.C. requirements, thus the Korean made computers may be sold in the U.S. (See guest editorial for more information.)

However other sources are skeptical. Apparently even a few weeks ago Sinclair (the U.S. and British) offices have denied any plans to sell anything but the QL. So it seems we will have to wait and see. We even heard a rumor that Montgomery Ward was going to carry all three computers in order to provide competition for the Commodore 64.

## Error CODES

We recently got a letter from Richard November who was understandably distraught about an unfortunate omission in issue #4. He had ordered it as a back issue in order to get the schematic for the TS-2068 edge connector. We had printed it, leaving out a portion that was similar to the TS1000 connector. Unfortunately we didn't consider the fact that many 2068 owners may not have the 1000 schematic to go by.

For those readers we are printing the full schematic below, along with a schematic for the ZX Spectrum: Please note that "B" at the end of some of the locations on the 2068 connector indicates that the pin is buffered.

These schematics are from the newsletter of the Jacksonville TSUG, 2708 Newsberry Road, Gainesville, Florida 32607.

## TS 2068 BUSS

## ZX SPECTRUM BUSS

TOP	BOTTOM	TOP	BOTTOM
GND 1 GND		A15 1 A14	
EAR 2 SPKR/TAPE OUT		A13 2 A12	
A7RQ 3 +15V		D7 3 +5V	
D7 4 +5V		not used 4 +9V	
DZIN 5 not used		slot 5 slot	
slot 6 slot		D0 6 GND	
D0 7 GND		D1 7 GND	
D1 8 GND		D2 8 0	
D2 9 0		D6 9 A0	
D6 10 A0		D5 10 A1	
D5 11 A1		D3 11 A2	
D3 12 A2		D4 12 A3	
D4 13 A3		INT 13 TORQGE	
INT 14 A15B		INT 14 GND	
NMI 15 A14B		HALT 15 VIDEO	
HALT 16 A13B		MREQ 16 Y	
MREQ 17 A12		TORQ 17 Z	
TORQ 18 A11		RD 18 U	
RDB 19 A10		WR 19 BUSRQ	
WRB 20 A9		-5V 20 RESET	
BUSAK 21 A8		WAIT 21 A7	
WAIT 22 A7		+12V 22 A6	
BUSRQ 23 A6		-12V 23 A5	
RESET 24 A5		M1 24 A4	
M1 25 A4		RFSH 25 ROMCS	
RFSHB 26 not used		AB 26 BUSAK	
EXROM 27 RGB red		A10 27 A9	
RDCS 28 RGB green		not used 28 A11	
BE 29 RGB blue			
IOAS 30 BUSISO			
SOUND 31 VIDEO			
GND 32 GND			

We also got a complaint about the Plotter program in issue #5. The program works fine on the TS1000. However the accompanying article says it will run on the TS2068, but this is not the case. This was not the fault of the authors of the program. We are currently preparing a correct 2068 version.

Thank you for your support of TS-Horizons. We believe that the companies that survived "The Great Timex Wimp-Out" also deserve your support. If we don't support them, they won't be around long. Whenever you write to a company mentioned in T-S Horizons tell them where you heard of them.

Thank you,  
Rick Duncan

## ZEAL DISASSEMBLER

For the T/S 2068

This is the only full-featured machine language disassembler available for the 2068. Some reasons for its wide acceptance since first being announced in the final issue of SYNC:

- \* Machine code routines for fast listings to screen or printer
- \* Zilog mnemonics; labeling of system variables; decimal addresses
- \* Instruction plus DEFB and DEFU disassembly modes
- \* Resolution of relative (JR and JNZ) addresses to absolute addresses
- \* Disassembly relocation support
- \* Identification of data bytes following RST 0B's & RST 40's
- \* ROM bank-switching; supports disassembly of all ROM banks
- \* Cross-reference listings of all JP's and CALL's

A professional-level tool for debugging/documenting any Z80 code and for exploring 2068 ROM. Cassette \$15.95.

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## GOLFERS

GOLF HANDICAPPER is a menu driven 16K BASIC program for your TS 1000, 1500, ZX81 which computes/saves/updates USGA handicaps for up to 48 players. With a printer attached you can print out scores and handicaps for all players. High quality cassette tape shipped in hard box and accompanied by full documentation. Send \$20 ck/no to John Carson 11200 Lockwood Dr. #307 Silver Spring, MD 20901

PLOTTER PROGRAM  
\* REVISION FOR THE TS 2068  
\* PREVIEW VERSION

```

1 GO SUB 200
2 LET Y=21: LET X=31
20 LET X=X+(1 AND INKEY$="8") -
(1 AND INKEY$="5")
24 LET Y=Y+(1 AND INKEY$="7") -
(1 AND INKEY$="6")
40 INK 0: PLOT X,Y
55 GO TO 20
200 PRINT AT 1,10; "PLOTTER"
210 PRINT "Press", "5 for DOWN",
"7 for UP", "6 for LEFT", "8 fo
r RIGHT"
220 PRINT "Press any key to sta
rt..."
251 PAUSE 4e4
252 CLS
255 RETURN
300 REM "MORE NEXT ISSUE"
```



# Guest EDITorial

3404 Pawnee Drive

Eben A. Brown, president



Alexandria, MN 56308

Phone: 612/762-8847

Timex Computerists:

## *Outlook Bright for New Products and Services.*

by Eben Brown

Immediately after TIMEX quit the computer business, it was kind of hard to tell where TIMEX-Sinclair computing was going in the United States. For computer owners, it was a matter of worrying about where you'd get support for the computers you had bought. For businesses like E. Arthur Brown Company, it was a matter of whether we could make enough money giving that support to pay for expenses and make a profit.

Things looked pretty bleak there for a while. With all of the screw-ups and poor management from TIMEX, most dealers and distributors hadn't been making any money for quite some time before the big announcement. The TS2068 looked like it was going to pull us all back on track. But TIMEX started messing up the market for that one, too. Then, when TIMEX quit, many dealers just decided they'd had enough and gave it up. You get to a point where you're tired of fighting after awhile.

Now that the dust has settled, I can see a bright star on the horizon for TIMEX computerists and Sinclair computers in the U.S. Unlike other companies that quit computers (ie. Texas Instruments), TIMEX wasn't the brains behind their machines. Sinclair Research of England designed them. Now, *they're* quite healthy and happy with the computer business. Their ZX Spectrum, essentially the same com-

puter as the TIMEX 2068, has sold over a million units world wide. They've even made a deal with an oriental company to manufacture the popular ZX-81 computers again. These are essentially the same as the TIMEX 1000. Finally, Sinclair plans to re-enter the U.S. market this Fall with the Spectrum and ZX-81 as well as their new business computer, the Quantum Leap. We'll probably begin distributing for them sometime in the first part of 1985.

Most of the software and peripherals that work on Spectrums and ZX-81s will work on TS2068s and TS1000s with little or no modification. This means that TIMEX computer owners will again have the support of a major manufacturer. It also means a continuing market for companies like our's, who sell to TIMEX and Sinclair owners. And, it's a message of stability to software and peripheral developers who need to know there's a future before investing in new products.

Many of you are probably wondering when the microdrives will be available. They've been available for some time now in England. I expect them in the U.S. this Fall or early '85 when Sinclair will be selling them. In the mean time, we're working on importing a commercial mini-disk drive from that country. It's supposed to handle a megabyte of data and cost around \$500. You'll spend about as much or more for less memory on 8 microdrives, but the mini-disk unit won't create such clutter

on your desk. I suspect Sinclair is thinking along the same lines... Rumor has it he struck a deal with Hitachi for a mini-disk drive.

On the home front, there are some rugged individualists that have answered the call to keep the public informed. The major magazines may have folded, but you can get some pretty top notch information from TS Horizons, Syncware News, and Syntax.

Already the flood of converted Spectrum software and peripherals has begun.

Tasman line of RS232 and Centronics interfaces, word processing, and utility software. A new line of English games is in here, too. And, we have the RGB conversion kit for those of you who want the perfect picture afforded by RGB monitors. All of these are brand new products for your TS2068 computer. Even more are coming! And, so you can start boning up on the next wave of Sinclair computers, we've imported a new line of books on the Spectrum and Quantum Leap.

Yes, the outlook is bright for owners of TIMEX and Sinclair computers. We'll try to keep you informed as we search out and find the latest new products. *But, make sure you're on our mailing list!* To put you on our permanent mailing list, you have to either buy something or specifically request to be put on our list. Call or write *today*.

**T-SH**

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## RUN FOR YOUR LIFE

An arcade type game that requires quick thought and reflexes. You have been separated from your platoon and you are out of ammo. Unfortunately five enemy soldiers and a malfunctioning robot tank are patrolling the mine sector you wandered into. They too are out of ammunition for they would have shot you on sight. HAND COMBAT ???! Your only chance is to RUN FOR YOUR LIFE! Look at some of these features:

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- \* 5 LEVELS OF DIFFICULTY
- \* ZEPHA JOYSTICK COMPATIBLE
- \* 1 TO 8 PLAYER CAPABILITY
- \* ALL INSTRUCTIONS IN THE PROGRAM

Written in machine code and basic.

## THE ZX/TS Scroll Kit

A scrolling utility for the basic programmer who wants to add a professional and interesting look to his programs. The kit consists of 12 BASIC to use USER routines. Note the following:

- 4 - Scrolling routines
- 4 - Rotating routines
- 3 - Inverse routines
- 1 - Instant screen fill routine

The ZX/TS SCROLL KIT comes with a 22 page user manual. Kit and demo on cassette. Written in machine code and basic.

ABOVE PROGRAMS ARE FOR THE ZX-81, TS-1000, and TS-1500 COMPUTERS WITH 16K RAM. Programs on high quality cassettes.

Send \$10.00 for each program plus \$2.00 shipping to:  
(CA or MD)

P B THORNTON  
3806 North 97th Place  
Milwaukee, WI 53222

## TS2068 PROGRAMMING TIPS

Our thanks to Games to Learn By for letting us borrow these tips from their Timex Survivors Flyer (P.O.Box 575, 2 South Street, Williamsburg, MA 01096).

\*\*\*\*\*

### 1st + 2nd Displays

\*\*\*\*\*

You can use this routine to move the Function Dispatcher so you can utilize the 2nd Dispatcher.

```
10 CLEAR 39999
20 FOR i=40000 to 40017
30 READ n:POKEi,n
40 NEXT i
50 DATA 1,254,254,205,153,100,62,
      2,205,142,14,1,255,0,205,89,
      252,201
```

After the 1st use, you then have to use these commands-otherwise you will BOMB OUT.

```
OUT 255,2 for the 2nd Display
OUT 255,0 for the 1st Display
```

\*\*\*\*\*

### 22nd + 23rd Display Lines

\*\*\*\*\*

If you would like to use the 22nd + 23rd lines on the screen without using the INPUT COMMAND, use this command

```
PRINT #1:AT 0,2:"Hi there!!"
PRINT #1;AT 1,5;"Bye Now!!"
```

The computer will continue to process the program, which is fine unless you have to put a question or a prompt and are waiting for a response.

In which case you would have to put in a loop so that until you got your needed answer the program would not continue.

\*\*\*\*\*

### Just for FUN try this

\*\*\*\*\*

```
10 CLS
05 INK 0: ON ERR GO TO 1
```

```
10 INPUT INKO;"Enter Number";n
15 IF n<210 THEN GO TO 10
17 IF n>800 THEN GO TO 10
20 INPUT INKO; "Enter Ink";i
25 IF i<0 THEN GO TO 20
30 IF i>7 THEN GO TO 20
35 CLS
40 INK i; PLOT 75,85: DRAW 50,50
   ,n
42 REM 50,50 can be changed to
   25,25
43 PRINT #1; AT 0,0;"PRESS Z for
   copy to PRINTER"
45 PRINT #1; AT 0,0;"Press any
   other key to continue"
46 IF INKEY$="" THEN GO TO 46
49 IF INKEY$="Z" THEN COPY :
   LPRINT "Number";n:LPRINT:
   LPRINT
50 GO TO 10
```

\*\*\*\*\*

### SCROLLING

\*\*\*\*\*

If you POKE a number from 1 to 255 into the location 23692, the computer will scroll that many line plus 21 (IF THERE IS THAT MUCH TEXT TO BE SCROLLED)

Otherwise it will return to the beginning of the text and use that to print the number of lines you estimated.

POKE 23692,# #=Any number from 1 to 255

\*\*\*\*\*

### Faster Control

\*\*\*\*\*

If you have a long text to edit and you feel like your computer is worn out before it starts, - OR if your laser guns aren't firing fast enough for you, -- Try these commands BUT BEWARE!!!

\*\*\*\*\*

POKE 23561,# (# = 1 TO 35)  
(I prefer 10 to 15 for Text)

POKE 23562,# (# = 1 to 5)  
(I prefer 3 for Text)

For the touch typist this is really a terrific advantage.



\*\*\*\*\*

## MORE FLAGS

\*\*\*\*\*

For those of you that do some business programming where you would like to capitalize occasionally, here is POKE for you!!

POKE 23658,8 (CAPITALS)

\*\*\*\*\*

## BEEP for TYPING

\*\*\*\*\*

For those of you who are Hard of Hearing or just like to hear the reassuring beep of the typewriter keys, Try this Command:

POKE 23609,# (# = 1 to 255)

The sounds range from wood blocks to Morse Code. 0 being no sound. **T-5H**

## FOOTE SOFTWARE

LOOK at these new programs for your Timex/Sinclair computer:

\*CALORIE COUNTER--a menu driven program to help health conscious individuals track their calorie intake and requirement.

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\*\*\*\*\*

## SMALL BUSINESS ACCOUNTING

\*\*\*\*\*

TIMEX SINCLAIR 2068 COLOR COMPUTER

- ☐ **ACZ GENERAL LEDGER 2.000**--An advanced, yet easy to use accounting system for your 2068. Prints the Income Statement (P&L), Balance Sheet, Equity Statement, Journal Entries, Ledger Detail and the Chart of Accounts. Supports both monthly and year-to-date statements. Up to 150 accounts and 800 entries and accounts per month. Includes a built-in interface for the optional Cardco numeric keypad (see below).

The comprehensive instruction manual comes in a loose leaf binder, and even shows how to let other programs interact with the General Ledger. **\$39.95**

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SOFTWARE

PRINTERS

# ROTATING GLOBE ROUTINE by Mihaly Grell

For the TS 2068

The following program was created by Mihaly Grell of the Capitol Area T/S User Group (C.A.T.S.), P.O.Box 725, Bladdensburg, MD 20710, in a recent issue of their newsletter. Grell's program demonstrates the graphics capabilities of the TS 2068.

```

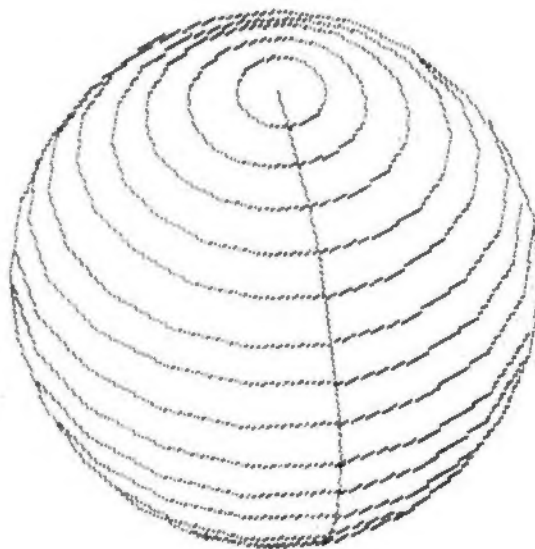
10 REM Globe Rotating Routine
11 REM B. Mihaly Grell
12 CLEAR 31999
13 REM phi=Forward rotation
14 REM psi=Side rotation
15 REM std=step for latitude
16 REM lstd=step for longitude
17 REM sc=plot scale factor
18 LET phi=30: LET psi=45
19 LET std=10: LET lstd=20
20 LET sc=100: LET dtr=PI/180
21 LET ch=cos(phi*dtr)
22 LET sh=sin(phi*dtr)
23 LET cs=cos(psi*dtr)
24 LET ss=sin(psi*dtr)
25 LET a21=ss*sh: LET a23=-ss*
26 ch
27 LET a31=-cs*sh: LET a33=cs*
28 ch
29 LET zz=32000
30 FOR m=0 TO 3
31 FOR d=90 TO -90 STEP -std
32 LET p=0
33 LET dr=d+dtr: LET cd=cos dr
34 LET sd=sin dr
35 FOR a=0+m*std/4 TO 360+m*st
36 STEP std
37 LET ar=a+dtr: LET sa=sin ar
38 LET ca=cos ar
39 LET x0=cd*ca: LET y0=cd*sa
40 LET x=ch*x0+sh*sd
41 LET y=ss*x0+cs*y0+a23*sd
42 LET z=a31*x0+ss*y0+a33*sd
43 LET yp=128+y*sc: LET zp=88+
44 z*sc/1.22
45 IF p THEN DRAW yp-y1,zp-z1:
46 LET y1=yp: LET z1=zp
47 IF p=0 THEN PLOT yp,zp: LET
48 y1=yp: LET z1=zp: LET p=1
49 NEXT a
50 NEXT d
51 LET dr=d+dtr: LET cd=cos d
52 LET sd=sin dr
53 FOR a=0+m*std/4 TO 360+m*st
54 STEP std
55 LET ar=a+dtr: LET sa=sin ar
56 LET ca=cos ar
57 LET p=0
58 FOR d=90 TO -90 STEP -std
59 LET dr=d+dtr: LET cd=cos dr
60 LET sd=sin dr
61 LET x0=cd*ca: LET y0=cd*sa
62 LET x=ch*x0+sh*sd
63 LET y=ss*x0+cs*y0+a23*sd
64 LET z=a31*x0+ss*y0+a33*sd
65 LET yp=128+y*sc: LET zp=88+
66 z*sc/1.22
67 IF p THEN DRAW yp-y1,zp-z1:
68 LET y1=yp: LET z1=zp
69 IF p=0 THEN PLOT yp,zp: LET
70 y1=yp: LET z1=zp: LET p=1
71 NEXT d
72 NEXT a
73 NEXT d
74 NEXT m
75 RESTORE 710: FOR n=64000 TO
76 64011: READ q: POKE n,q: NEXT n
77 RANDOMIZE USA 64000
78 DATA 33,0,64,17,zz-INT (zz/
79 255)+255,INT (zz/255),1,0,24,237
80 ,17,201
81 RETURN
82 CLEAR 31999
83 LET zz=32000
84 FOR i=0 TO 33 STEP 11
85 RESTORE 820: FOR n=64000+i
86 TO 64010+i: READ q: POKE n,q: NE
87 XT n
88 DATA 33,zz-INT (zz/255)+255
89 ,INT (zz/255),17,0,64,1,0,24,237
90 ,17,201
91 LET zz=zz+7000
92 NEXT i
93 POKE 64044,201
94 IF INKEY$="" THEN RANDOMIZE
95 USA 64000
96 IF INKEY$="" THEN GO TO 91
97 GO TO 900
98 SAVE "globe.rn"
99 SAVE "globe.rm" CODE 32000,230
100


```

```

405 REM Globe Rotating Routine
406 LET first=0
407 FOR i=0 TO 360 STEP 15
408 LET ang=i+dtr
409 IF first=0 THEN LET q1=cos
410 ang: LET q2=sin ang: PLOT 128+sc
411 +q1*sc/1.22+q2: LET first=1
412 LET r1=cos ang: LET r2=sin
413 ang: DRAW sc*(r1-q1),sc/1.22+(r2
414 -q2): LET q1=r1: LET q2=r2
415 NEXT i
416 GO SUB 700
417 LET zz=zz+7000
418 CLS
419 NEXT m
420 GO TO 800
421 RESTORE 710: FOR n=64000 TO
422 64011: READ q: POKE n,q: NEXT n
423 RANDOMIZE USA 64000
424 DATA 33,0,64,17,zz-INT (zz/
425 255)+255,INT (zz/255),1,0,24,237
426 ,17,201
427 RETURN
428 CLEAR 31999
429 LET zz=32000
430 FOR i=0 TO 33 STEP 11
431 RESTORE 820: FOR n=64000+i
432 TO 64010+i: READ q: POKE n,q: NE
433 XT n
434 DATA 33,zz-INT (zz/255)+255
435 ,INT (zz/255),17,0,64,1,0,24,237
436 ,17,201
437 LET zz=zz+7000
438 NEXT i
439 POKE 64044,201
440 IF INKEY$="" THEN RANDOMIZE
441 USA 64000
442 IF INKEY$="" THEN GO TO 91
443 GO TO 900
444 SAVE "globe.rn"
445 SAVE "globe.rm" CODE 32000,230
446

```





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## HOW A COMPILER WORKS

By: John Coffey

A compiler is a program that takes a high level language like BASIC and converts it to machine code. The miracle of a compiler is that people who just have a slight knowledge of machine code can write complex programs that execute much faster than ordinary BASIC programs.

The compiler I have written is itself a BASIC program. It cannot convert itself, however, to machine code, because only certain commands are handled by the compiler and many other commands beside these are used in the process.

The machine code that is produced is simple to understand. The Z80 has over 700 instructions and the compiler probably uses less than 20 of them. In fact, the whole process of compiling is more a matter of record keeping than anything else. I've compiled BASIC for years by hand with pencil and paper.

The ability of the compiler to keep track of things really becomes apparent when you consider instructions like "GOTO 100". In assemble language this might look like "JP 64000", which is a simple instruction that just takes three bytes. I say "might" because it is a tricky business to know where line 100 would be in memory. It might not be a location 64000, but instead at 62000 or 60000 etc.

To solve this problem the compiler makes two passes through the BASIC, or to put it another way, it compiles the program twice. The first time through it remembers where each line is compiled to in memory. The second time through it fills in the "JP" instructions with appropriate addresses.

But what about the actual BASIC instructions such as LET, POKE, PRINT etc?

An instruction like...

LET A=B

...is easy to translate to machine code and would look like this on my assembler:

```
ld hl, (B loc)
ld (A loc),hl
```

The contents of the B variable are first loaded into the hl register and then the hl register is loaded into the A variable. This is not very difficult for the microprocessor to do and requires only about 7 microseconds to accomplish.

What IS difficult about the above instruction is that the compiler has to know where to find the variables A & B. This ability of the compiler to keep track of details helps a great deal in the translation process.

As an important note I will also mention that the above instruction is written in BASIC backwards compared with the way it is executed in machine code. The BASIC expression puts "A" before "B", but in machine code the contents of the B variable have to be found before it can be transferred to the A variable.

More complex "LET" statements involve the use of more than one register. Consider the following example:

LET A=B+100

In assembly language this would look like:

```
ld hl,(B loc)
ld de,100
add hl,de
ld (A loc),hl
```

This is exactly the same as before except two instructions have been added in the middle.

The first three assembly language instructions above constitute the math expression "B+100". The last assembly language instruction makes up the actual "LET" command. The ability of my compiler to evaluate



# BANK SWITCHING FOR THE TS 1000 Part 4

## Expand To 96K - by Paul Hunter

### THE NONVOLATILE MEMORY BANK

After constructing the two 16K banks described last month, and experimenting with them, I felt the need for at least some permanent (nonvolatile) memory. Loading a full 64K of memory from tape can be tedious, even with SDS or ZXLR8. So I decided to make one of the four 16K banks a nonvolatile block of memory.

There are four types of nonvolatile memory (not including magnetic media -- discs, tapes, and bubbles). The first, and most permanent, is ROM (like that 8K IC inside the ZX81 containing the SINCLAIR operating system). The second type is EPROM which has a window to allow it to be erased by exposure to UV light. The EPROM IC is almost always programmed out of the circuit in which it is to be used. The third is E<sup>2</sup>PROM -- electrically erasable and therefore no window; much easier to erase and program in situ. It does suffer from a limited write-erase cycle compared to RAM -- you can rewrite into a location only up to about 10000 times although 1 million write-erase cycle IC's will be available soon. Data retention is of the order of 10 years. The fourth and final type of nonvolatile memory is CMOS static RAM with a back-up power supply. The extremely low standby power requirement (less than 1 microamp at 2.2V) allows the use of small nickel-cadmium batteries or lithium cells.

For versatility, and experience, the first half (8K) of the nonvolatile bank was configured for static CMOS RAM and the second half was designed to hold four 2K 52B13 latching 16K bit EPROM's (or the pin compatible 2716 EPROM's). More banks, if necessary, can be allocated to EPROM-based software. Programs like ZX-PROFILE (and many others) are available on EPROM from ROMPAK. Other firmware such as HOT-Z, the DELPHIC programmer's TOOL-KIT, ZXLR8 or SDS, are best switched in and out of the 8-16K transparent block.

### THE CMOS RAM BOARD

The 8K CMOS RAM board is based upon the HUNTER nonvolatile memory board with some modifications to ensure complete data integrity within

the system. The price of the HM6116LP-3 memory IC's used on the board rose by 100 percent from July 1983 to February 1984 but fortunately the price, now about \$7 each, seems to be returning to a downward trend. The LP4, with a 200ns access time, work just as well -- as do the regular P4 at a slightly higher (approx. 5x) back-up current requirement.

The NVM board allows selection of any 8K block within 32K by jumper J1 (see Figure 1). Both 8K boards in this expanded system are enabled through an active low signal at pin 1 of the 74LS139 decoder on each board.



CMOS RAM BOARD  
48 - 56 K



E<sup>2</sup>PROM BOARD  
56 - 64 K

FIGURE 1

As mentioned above, some modifications were made to the board to ensure data retention. If some of you have the earlier versions of the board you might wish to incorporate these changes anyway.

1. Diode D3 (from the main power supply) was replaced by a germanium diode 1N270 -- to reduce the voltage drop across it.
2. A fairly large-value miniature capacitor (33 or 47 uF) was placed from the back-up

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power supply line to ground. This ensures a slow decay in the 5V supply at the CMOS RAM as the system goes down.

3. A write-protect switch was added to prevent accidental overwriting of data.

The changes can be made as shown in Figure 2. A board configured in this way will not lose any data even if the power plug is repeatedly pulled.

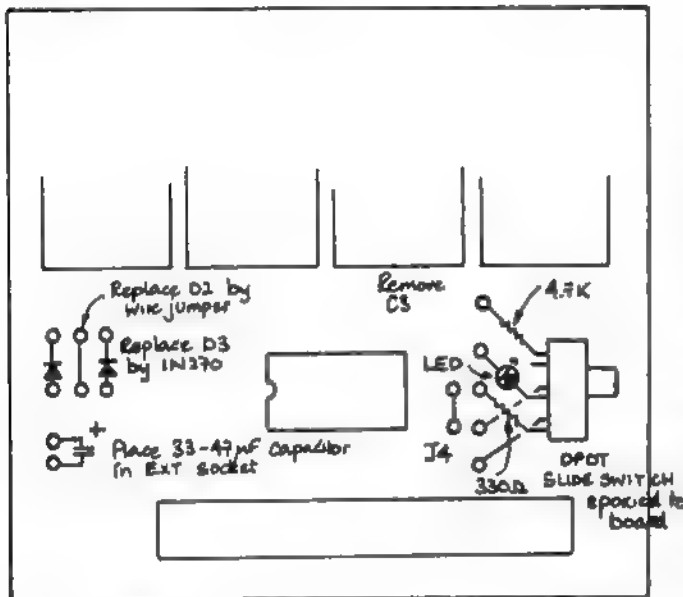


FIGURE 2

#### THE EPROM BOARD

I used another nonvolatile memory board for the four E<sup>2</sup>PROM's but a perfboard (Radio-Shack 276-152A) can be used equally well. Writing into an E<sup>2</sup>PROM is a little more involved than writing into ordinary RAM. It is however easier than writing into an EPROM and it is made even easier for the SEEQ 52B13 because

all data and control signals are latched on the leading edge of  $\overline{WE}$  so that all that is necessary is to hold  $\overline{WE}$  low for the duration of the write (10 ms for the ordinary 52B13 or 1 ms for the faster H-suffixed version). The only other requirement is to 'erase' the addressed byte prior to writing into that location.

Holding  $\overline{WE}$  low (active) for 10 ms can be done using a monostable (one-shot) like the 74LS123 or it can be achieved through software. Use of a 74LS123 monostable for stretching the  $\overline{WE}$  pulse has been described in an article by Joe D. Blagg in the February issue of BYTE (page 343). The use of a software timing delay is described in the SEEQ application note #8 by Danton Leonard (page 10). Since this method requires less hardware it was the method chosen. The advantage of a hardware controlled delay is that it does allow the CPU to do more useful things during the 10 ms write.

The interface (see SEEQ application note #2 page 2) involves a 74LS32 and a 74LS00. The circuit is illustrated in Figure 3. Two gates in the 74LS00 are configured as a flip-flop -- turned on by the  $\overline{WR}$  signal and turned off by the  $\overline{RD}$  signal. The 10 ms write is then determined by the time interval between a POKE and a PEEK of a particular location. Programming the EEPROM using BASIC is quite efficient due to the time delay required anyway.

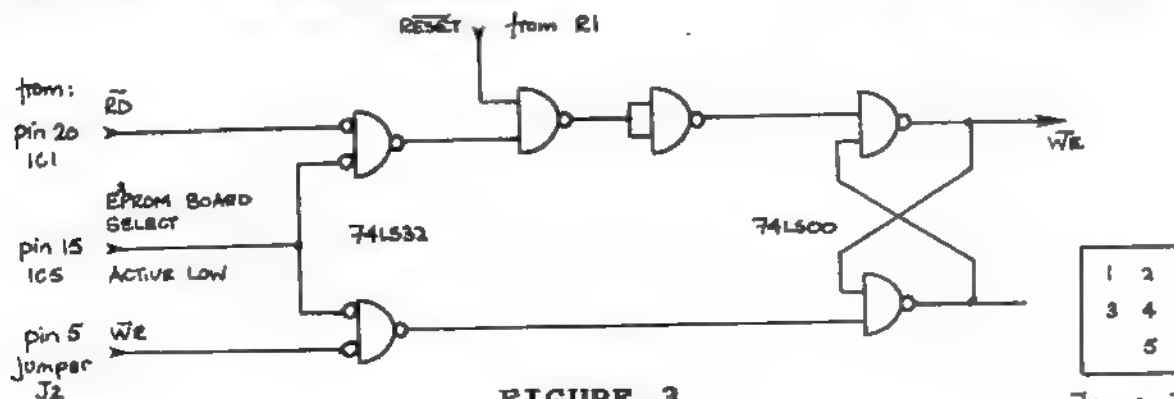


FIGURE 3

Jumper J2 13

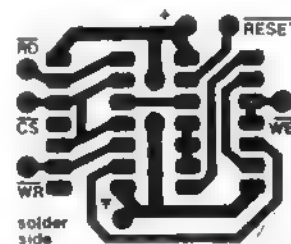


FIGURE 4

The two IC's, with a decoupling capacitor, are mounted on the small pc board shown in Figure 4. This board is then piggy-backed onto the back of an NVM board using double sided adhesive foam (from Radio-Shack). The pc board was designed by Walter Komlosy earlier this year -- and since there's little point in reinventing the wheel (particularly one that works), it is reproduced here with acknowledgement. The BASIC program Walter Komlosy used to program the E<sup>2</sup>ROM's is also reproduced here with permission:

```

100 INPUT A
110 INPUT D
115 REM ** ERASE BYTE **
120 POKE A, 255
130 PAUSE 2
140 IF NOT PEEK A = 255 THEN GOTO 120
145 REM ** WRITE **
150 POKE A,D
160 PAUSE 1
170 SCROLL
175 REM ** VERIFY **
180 PRINT A,D;" - ";PEEK A
185 REM ** NEXT ADDRESS **
190 LET A=A+1
200 GOTO 110

```

The PAUSE statements at lines 130 and 160 provide the delay required. PAUSE N in the SINCLAIR BASIC suspends execution of the BASIC program for N frames at 60 frames a second. So PAUSE 1 effects a delay of 16.7 ms. Interpretation of the BASIC commands increases the delay -- the specifications for the 52B13 call for a minimum delay of 9 ms and a maximum delay of 70 ms.

Next month we will look at the power supply (you've probably noticed it getting hotter each month) and at the display (all of the various additions do generate more RF interference). In addition, some of the operating routines will be established.

Meanwhile here is a pair of simple routines you can use to save an entire 16K program in one of the 16K banks and then subsequently reload it (again courtesy of Walter Komlosy). Place the two routines in the 8-16K block and call using the USR function. These routines can of course be used with an ordinary 64K RAM pack. Set RAMTOP at 48K and execute the SAVE routine. Doing this periodically during program development can avoid considerable anguish in the event of a crash. The advantage of the banked memory is that several 16K programs can be stored in the upper 48 to 64K region.

#### SAVE

205	35	15	Call FAST
17	9	64	LD DE, 16393 (VERSN)
42	20	64	LD HL, (16404) (E_line)
183			OR A
237	82		SBC HL, DE
68	77		LD BC, HL
33	8	192	LD HL (start of bank)
113			LD (HL), C
35			INC HL
112			LD (HL), B
35			INC HL
235			EX DE, HL
237	176		LDIR
201			RET

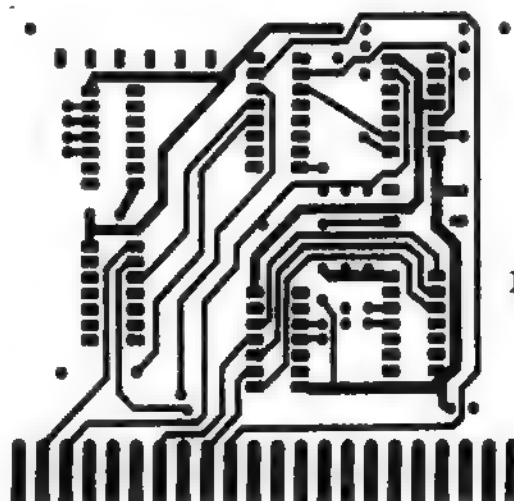
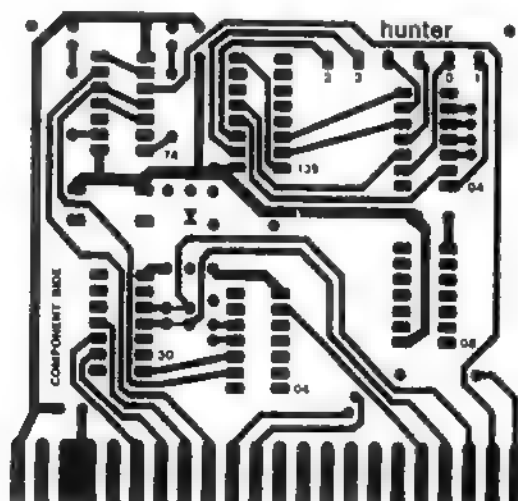


FIGURE 5



Note that **VERSN** marks the start of RAM to be saved and **E\_line** marks the last byte to be saved.

#### RELOAD

```

285  35  15  Call FAST
237
  75   0 192  LD BC, size
  17   9  64  LD DE, 16393 (VERSN)
  33   2 192  LD HL (start of bank)
237 176      LDIR
281          RET

```

Finally this month, as promised last month, is the schematic for a printed circuit board for the memory manager (the board combines Figure 6 of Part 2 and Figure 2 of Part 3). The board provides six output signals: two active high signals for the 16K RAM boards addressed 16-32K and 32-48K; two active high signals to enable banks 0 and 1 (these are again 16K RAM boards); and two active low signals labelled 3 and 4 for banks 3 and 4 (one of these is used for the nonvolatile memory boards described this month). The foil patterns are illustrated actual size in Figure 5. The pads on A5 and A6 en route to the 74LS30 allow optional inversion of these lines through jumpers to reassign the bank enable addresses. If there is sufficient demand for these boards they will be available solder masked and plated-through for \$13.85 plus \$1.95 shipping and handling. If not, then the board will still be available but it will not be masked or plated-through for \$11 plus \$1.95 shipping and handling. The six IC's, two LED's, four resistors, five capacitors, reset switch, and output connector pins, are available for \$5.88.

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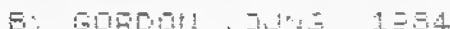
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Here is the last installment of the word processor program for the TS-1000 computer. It includes all of the machine codes which begin at address 18455 (Line 4 REM). Last month (June issue), I gave you the bulk of the program that lies in REM lines 2 and 3. There were quite a few codes to enter and I hope you made no mistakes! REM line 5 codes are listed here also. You can live with or without them. They merely produce the graphics "WORM" as Rick has shown in the headers of these articles. The codes for this are also included in this last installment should you wish to include them. Lets get to work.

9977 LET N= 18455

If you enter RUN 9977, you can begin entering the codes from the listing. Again, these codes are to be entered one at a time left to right, top to bottom. When all entries have been made line 4 is complete! Check your entries with the listing program from page 15 of the APRIL/MAY issue (lines 8050-8065). Make corrections if necessary before attempting to RUN this program! This in itself may be quite a task of PEEKing and POKEing so I once again stress the importance of careful code entries. It would be great if I could enter the address along with each individual code, but this took 30 pages on graph paper and I am sure Rick would have the fits if I submitted it in this way for TS HORIZONS!

Right now you should have lines 1 through 4 filled with about 2,000+ machine codes. Figure 2 contains the BASIC program to use. You will have to remove lines, add lines and do this and that to put it all in place. You no longer need the assembler, checksum or listing routines (if your entries are correct, that is).

As listed, this is ready to run on the TS-2040 printer. For the moment, lets worry about getting the program running. Type in the BASIC program and enter GOTO 10. This will get things going. A MENU appears and asks if you want to:

```
INITIALIZE
WRITE
SAVE
PRINT
CONTINUE
CLEAR TEXT
```

Press (1) to Initialize. You are asked for the number of columns. When using the TS-2040, enter anything from 20 to 32. Text will be processed to this width for printing later. The next prompt wants to know if you have Upper/Lower case text capabilities. The

[illegible]

TS-1000 has no lower case by itself with the 2040 so enter "N". If you are using an interface which has the Sinclair to ASCII conversions along with the lower case text, you can go ahead and answer "Y" provided you alter the program lines 6020-6060 to accommodate your printer commands. The program now returns to the MENU.

WRITE simply goes into the text writing routine. If you answered "N" to the Upper/Lower case question in the initialization, the keyboard will not respond to shifted characters (used to make inverted video text which makes Upper case in interfaces). A text-remaining counter appears on

the lower left along with the text mode to the right. A cursor denotes typing position. The typed line is always the same. It goes from left to right. When a complete line has been written, it scrolls, clears the typing line and begins at the leftmost column (like carriage return). You can use shift-arrow keys to move around (global edit). If you want to stop and make a new line like at the end of a paragraph, use two Pound signs. This flags the program to start a new line. You do not need to enter any spaces after the 2 Pound signs provided you do not follow them with more Pound signs! A single Pound sign which is directly followed by two numbers will cause a TAB, where the 2 numbers signify

```

10 CLS
15 PRINT TAB 8 " "
20 PRINT TAB 8 " "
25 PRINT TAB 8 " "
30 PRINT TAB 8 " "
35 PRINT TAB 8 "1. INITIALIZ
40 PRINT TAB 8 "2. WRITE
45 PRINT TAB 8 "3. SAVE
50 PRINT TAB 8 "4. PRINT
55 PRINT TAB 8 "5. CONTINUE"
60 PRINT TAB 8 "6. CLEAR TEX

75 IF INKEY$ = "1" THEN GOTO 100
80 IF INKEY$ = "2" THEN GOTO 200
85 IF INKEY$ = "3" THEN GOTO 300
90 IF INKEY$ = "4" THEN GOTO 600
95 IF INKEY$ = "5" THEN GOTO 400
100 IF INKEY$ = "6" THEN GOTO 500

110 GOTO 75
1000 CLS
1010 PRINT "HOW MANY CHARACTERS
PER LINE?"
1020 INPUT A
1030 POKE 17900,A
1031 DIM P$(A)
1032 DIM L$(A+2)
1033 DIM I$(6000)
1038 PRINT "UPPER AND LOWER CA
SE?"
1040 IF INKEY$ = "Y" THEN GOTO 105
1045 IF INKEY$ = "N" THEN GOTO 106
1050 GOTO 1040
1055 POKE 16517,1

1060 GOTO 10
1065 POKE 16517,0
1070 GOTO 10
2000 CLS
2010 PRINT "USE
FOR MENU
2020 PRINT
2030 PRINT
2040 PRINT
2050 RAND USR 16528
2060 GOTO 10
3000 PRINT TAB 8 "PREPARE RE
GORDER"
3010 PRINT "PRESS AN
Y TO SAVE"
3020 FOR N=1 TO 100
3030 NEXT N
3040 IF INKEY$ = " " THEN GOTO 3040
3044 SAVE "GORD"
3045 CLS
3046 RAND USR 16102
3047 PRINT AT 15, "B. GORDON,
UNG (1981)
3049 FOR N=1 TO 50
3050 NEXT N
3055 GOTO 10
4000 CLS
4005 RAND USR 16535
4010 GOTO 10
5000 RAND USR 17725
5010 GOTO 10
6000 CLS
6010 RAND USR 17911
6020 LPRINT P$
6030 REM
6040 REM
6050 REM
6060 REM
6070 IF PEE 17907=0 THEN GOTO 6
100
6080 RAND USR 17913
6090 GOTO 6020
6100 GOTO 10

```

THE BASIC PROGRAM PORTION  
(LINES 1-5 NOT SHOWN) FIGURE 2



certain calls to make. You should delete Line 6020 which is used for the 2040 printer. My interface uses RAND USR 8222, yours may differ but should be written in the program to replace line 6020. Any initialization you require should be inserted in line 1001-1009.

When you are satisfied with the text and wish to return to the MENU, use shifted "I". This

[illegible]

unless you want to erase the entire page of text! 6,000 characters are erased in about 1 second.!

Figure 3 is the listing for REM line 5. If you do not enter these codes, remove BASIC program line 3046-3050!

With a little use, you will be writing quality text on any Sinclair printer system. WORM is a very good, simple and versatile word processor. I have used it over and over again to write letters, articles and other documents. I hope that some of you find it as useful as I did. This program is an alternative to expensive (but excellent) EPROM add on word processors (like MEMOTEXT), or some of the less than adequate software (which gets put in the "you gotta be kidding" drawer). I will offer this program to TS HORIZON subscribers for \$8 since this really is quite a program challenge. Although slow, I will answer all inquiries concerning this program provided you accompany it with a stamped self-addressed envelope.

Next , I want to write about the TS 2068.  
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## SPECIAL SECTION

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# MODEM & TELECOMMUNICATIONS

T/S 1000/1500

ZX 81

T/S 2068

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### TELECOMMUNICATIONS FOR BEGINNERS

By: Doug Gangi

To communicate with another computer, you need a device called a MODEM. There are 2 types of these devices. One is called a DIRECT CONNECT modem, and the other is called an ACCOUSTICAL modem. The direct connect modem plugs directly into the phone line. The accoustical modem is the type you saw on the movie, War Games. With it, you plug the telephone handset into 2 holes. The Direct connect modems are actually better for accuracy in transferring data (the accoustical modems sometimes give you many errors in a noisy environment or where there is lots of interference (near a tv set for example)). There is a main advantage accoustical modems have over direct connect modems, and that is price. Many people I know also buy an accoustical modem so they can use their computer (if they travel) with a pay phone.

Baud rate is the speed in which data is transferred. 300 baud is actually the same baud rate that the TS 1000 cassette system works. Most modems work at 300 baud (that is the standard baud rate). Other modems can work at 1200 baud, and even 2400 baud. Terminals often work at speeds of 9600 baud.

With a modem, you can call up free bulletin boards and large databases. In the Phoenix metro area alone, there are 30 bulletin boards. On bulletin boards, you can leave private mail to your friends, enter public messages to announce an upcoming event, or join in on a conversation that other users

are having. Some good bulletin boards even have free games for you to play.

There are a few large databases. Such ones are CompuServe, The Source, Dow Jones, and a few local ones. With large databases, a user can access a library of information, read newspapers, enter E-MAIL, check the weather, and play many games. The rates for these databases range for \$6 per hour to \$19.95 an hour. If you want to try CompuServe, you can buy a trail packet in a computer store for approximately \$30 (includes 5 free hours on CompuServe).

Telecommunications is an exciting hobby. I spend usually 2 hours on bulletin boards a day. I have also met many new friends on these bulletin boards and have even met them at get-togethers. I am sure there is something in telecommunications for everybody. Many people like the free bulletin boards, others like the databases. I highly suggest a modem to you so you can join the exciting world of telecommunications. Even if you don't use the modem that often, I'm sure you'll get your money's worth plus much more.

If you live in the Phoenix metropolitan area and would like a list of all the bulletin boards, write to or call:

Doug Gangi  
3754 E. Desert Cove  
Phoenix, AZ 85028  
(602) 996-3672

T-SH



## The Sinclair Information Network (S.I.N.)

The Sinclair Information Network is designed to be a marketplace for ideas and information concerning all of the Sinclair and Timex/Sinclair computers.

Formed by Mark L. Fendrick, owner of (and author for) Markel Software, the SIN was born out of frustration felt when Timex exited the computer field, and the major Sinclair related publications followed. The SIN is a free forum and may be "accessed" in many ways.

1) VIA THE SOURCE - If you are registered on the source, you may be placed on the SIN Sourcemail list by sending a message to BCA632. In this message state that you would like to join SIN, and state what type of equipment you own and use (or don't use). Anything that you feel relates to the Sinclair computers would be sent to the same ID#. This information will be coordinated and sent via Sourcemail approximately once a week to all registered members.

2) VIA COMPUSERVE - The same service as listed above is also available on CompuServe, to join, send a message to 74216,1245.

3) LOCAL BBSs - Local coordinators are being sought out to bring the network to the local bulletin boards. To be a local coordinator, just post a message on a local BBS announcing the SIN and its purposes, and request that any comments, suggestions, tips, resources, ideas, etc.; be left in a public message to you. On a regular basis, send that info to the national coordinator via the Source, CompuServe, or to Mark L. Fendrick c/o Computer Shopper, P.O.Box F, Titusville, Florida 32796.

4) PUBLICATIONS COOPERATING WITH THE SIN - If you do not have a modem, you can still be a part of the SIN thanks to Sinclair publications that are working with the SIN. Mark L. Fendrick's Timex/Sinclair column in Computer Shopper will be the focal point. This

column, which appears each month, will help the Sinclair computerist to get the most from his computer.

Can we count you?

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-Coordinator-

Sample of information transmitted to S.I.N. members via sourcemail 6/11/84:

Howard SAMS publishing has now announced that due to the volume of mail they will now publish the intermediate/advanced guide for the TS2068. For more info call toll-free: 1-800-428-SAMS or write: Howard SAMS Publishing, 4300 West 62 Street, Indianapolis, Indiana 4

There is now a BBS in NYC that is dedicated to the SINCLAIR computers. It is run by ZEBRA Systems. 212-296-2229.

If you use local BBSs in your area, you could become a local SIN coordinator. Post a message announcing the SIN, and ask for messages. Pass you receive here, and inform everyone of anything you hear.

There is also a SINCLAIR subboard on Omnimat. 212 837-2881 in NYC.

The Timex technical manual is now available from Timex--\$25.00. Write:

TIMEX  
Product Service Center  
P.O.Box 2  
Little Rock, Arkansas 72203

SIN needs a SOURCE BOARD listing of its own. Send SOURCE MAIL to TCAOSS and request that --More-- we be listed on THE SOURCE BBS.

Be sure to read my monthly Timex-Sinclair column in COMPUTER SHOPPER. For subscription info send SOURCE MAIL to TOS575.

Mark L. Fendrick

Coordinator-SIN

### TIMEX/SINCLAIR USER BULLETIN BOARD

Zebra Systems has provided T-S Horizons with the information below on a bulletin board service especially for Timex and Sinclair users. Future plans include providing programs that modern users can download into their own system and save for their own use.

NEW ZEBRA SYSTEMS BULLETIN BOARD  
FOR TIMEX/SINCLAIR USERS  
(212) 296-2229

To All Timex Modem Users,

Zebra Systems, Inc. is proud to announce that the Zebra Systems BBS is now online and available to callers.

The Zebra Systems BBS is devoted to Times/Sinclair users nationwide. Available 24 hours a day, 7 days a week it will be a central information exchange for Timex/Sinclair Computer owners across the U.S.A. Access to the BBS will be free of

charge. (Only telephone company charges apply.) We do not charge for connect-time.

Features include:

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- \* SIGS (Special Interest Groups) pertaining to the TS-1000 & TS-2068.
- \* E-Mail Section for User-to-User private mail.
- \* Zebra Systems Shop-at-Home service for Timex/Sinclair related products.
- \* Up-To-Date News on Timex happenings, new products, product reviews, etc...

Zebra Systems BBS is on line  
and ready for your call at  
(212) 296-2229.

Call now and join the growing number of Timex Telecommunications Network Users.

Zebra Systems, Inc.  
78-06 Jamaica Avenue  
Woodhaven, NY 11421

### THE KLEEN LINE MODEM PROTECTOR

You've probably heard of how power line surges, spikes, glitches, and brown outs can interrupt and even damage your computer system. Well, lightning and phone switching gear can create the same or similar conditions on your phone lines. The result

could damage your modem and computer system.

The Kleen Line modem protector has standard modular phone plugs and connects between your modem and your telephone jack. It uses two stage conductor and Gas Discharge Tube suppression techniques. An isolated ground is also employed to protect your equipment from the current produced in lightning discharges.

The Kleen Line is referred to as the PDS-11 by it's manufacturer. Order it by mail from Electronic Specialists, Inc., 171 South Main Street, Natick, MA 01760. The price is \$56.95.

Editor's Note: The above information is taken from E. Arthur Brown's new book on the Commodore 64. However we are told that the modem protector will operate just as well with a Timex-compatible modem.



## HARDWARE REVIEW

### Byte Back MD-2B modem

#### Order from:

Byte Back Co.

Rt. 3, Box 147, Brodie Road

Leesville, S.C. 29070

\$149.95 (A&T)

\$119.95 (KIT)

add \$4.95 for shipping and handling

(803) 532-5812

The Byte-Back MD-2B is an excellent choice for a modem for the Timex Sinclair computers. It plugs right onto the back of the 1000, 1500, and ZX81 computers. There is an extra kit you can buy that adapts the MD-2B to the TS 2068. It is an additional \$19.95.

Byte-Back has been making modems for the Timex Sinclair 1000/ZX81 for over a year, and their newest modem is great. It even beats the Timex 2050 modem. You may think not, because you can get the 2050 modem for only \$119.95, but the Byte-Back modem includes a down/uploading program and a free serial printer port, both of which the 2050 does not have (the downloading program will cost \$19.95 for the 2050 if, and when, it comes out, so that alone brings the price right up to the MD-2B). The MD-2B does not have auto dial/answer like the 2050, and they are not really that important. Auto answer is not needed at all, since if you leave the computer on, it will answer the phone everytime it rings, and that can be a nuisance. I also think the MD-2B has a much better terminal program for the 1000. With the MD-2B's terminal program (Z-COMM), you can send and

see an apostrophe, brackets, the "#" sign, and the "@" sign, all of which just show up as inverse grey spaces on the 2050's terminal program for the 2050, and they can't be sent (obviously).

The control characters on the MD-2B are sent very easily. You send them as if they were inverse characters. For instance, if you want to send a control "h" (a backspace), you would do the following: hold "SHIFT" down, press "9" (like you do to get into graphics mode) and press the "H" key. When you hit SHIFT 9, instead of the cursor being an inverse "G", it's an inverse "C", (for "CONTROL"). Z-COMM is available in a 2K and 16/64K version allows you to upload/download, and with 64K, there is a thing called "UPPER MEMORY FUNCTION" (it allows you to store programs and data in the upper 32K of memory when regular BASIC space gets full).

The printer port is serial and it's memory mapped. This means you can access it in BASIC using POKEs. If you want to buy a program so you can use LLIST, LPRINT, and COPY, Byte-Back sells one. The port also adjusts to the baud rate of the printer, (and that also means the modem can too).

The modem does not operate only at 300 BAUD, but 50-19500 BAUD (the Timex can only handle up to 2400 BAUD without going nuts, and even at that rate, there are lots of errors). So the modem can operate at higher than 300 BAUD, the host computer has to be sending at a higher rate than 300 BAUD. THERE IS NO CONTROL TO SEND AT A CERTAIN BAUD RATE...THE HOST HAS TO BE SENDING AT THAT RATE FOR THE MODEM TO OPERATE AT HIGHER THAN 300 BAUD!

I very highly recommend the MD-2B. It is an excellent modem, and you will find that telecommunications is a great hobby. I sure did, and with the free serial printer port, the MD-2B is an exceptional value.

If you have any questions about the MD-2B, call me at (602), 996-3672 (mst).

---

CACTUS	TS1000
SOFTWARE	ZX81

WORD PRO - Simple Word Processing	\$4.95
U.S. QUIZ - Test Yourself on Our Major Cities	\$4.95

Send S.A.S.E. For Catalog  
To 3754 EAST DESERT COVE  
PHOENIX, AZ 85028

---

# INTRODUCING

## "IN TOUCH WITH THE WORLD"

by Bill Fernebee

"Imagine pressing a key on your computer and being in touch with..." the WORLD! This is a slight paraphrase of an ad that Timex released when the TS 2068 was introduced. According to that ad, any T/S computer could be used to access any number of national and regional databases, and local BBSs (Bulletin Board Systems).

And this is true. Through the use of the TS2050 Communications Modem, any of these sources could be reached through the "Magic of Timex", this feat was to cost much less than with other computers. However, we all know what happened to Timex. And many thought that this meant the demise of the modem, along with the microdrives, the expansion bus, the full-size printer, the...

But the TS2050 Modem was not manufactured by Timex. Like the TS2040 Thermal Printer, which was made by Alphacom, the modem was contracted out to Westridge Communications of Marina Del Rey, California. And Westridge has decided to release the modem themselves. So it is available from many of the dealers you have dealt with for other T/S products.

The object of this column will be to explore the world of telecommunications, and make you aware of any sources that have a special interest in Timex/Sinclair owners.

In next month's column I plan to take a close look at the Westridge 2050 Modem, and explain its current capabilities. I know of at least two other companies (Byte-Back and Ramex) that have modems available that specifically work with T/S

## A NEW TIMEX TELECOMMUNICATIONS COLUMN

Computers. If either would like their modem to be reviewed in this column, get in touch with me at the address below.

Also, if you already have a modem, and you would to communicate with me, you can leave a message on the TRADE-80 BBS at (304)652-1416. This will be my "home on the phone." Or you can write to me at the address below. Until next month, HAPPY TELECOMMUNICATING!!!

Bill Fernebee  
MOUNTAINEER SOFTWARE  
115 North 7th Avenue  
Paden City, WV 26159

### Textwriter 2000 PLUS

Word processor for the TS2068 and the AERCO Centronics I/F. Full text editing features- add, delete, tab, block move, word wrap. Full menu-driven printout format control-page numbering, variable margins, & all printer features. Manual & cassette-\$24.95.

### Textwriter 2000

Same as above, but for use with TS2040 printer. Prints in 32 or 64 column mode in LH and RH halves. Book & cassette-\$18.95

Info & order: Robert Fingerle  
39639 Embarcadero  
Fremont, Ca 94538



## CONT from P. 11

math expressions is used with almost every command translated. It makes very little difference what the last instruction was. The first three instructions would have been about the same.

Commands like "POKE" are a bit more complex since two math expressions can follow it instead of the one used after "LET". The translation of "POKE B+100,X+y" will look like this:

ld hl,(B loc)	Evaluate
ld de,100	first expression
add hl,de	and store on ma-
push hl	chine stack.
ld hl,(X loc)	Evaluate
ld de,(Y loc)	second expres-
add hl,de	sion and store
ex de,hl	in de.
pop hl	Recover first
ld (hl),e	value and do a
	poke instruction.

The actual POKE instruction above only takes one command and all the other commands before it are used to evaluate the expressions.

This would have been much more complex if our instruction had been a "BEEP" or a "PLOT", because these two instructions use the 2068 operation system. Instead of just having one instruction, there would have been at least six following the expression evaluation.

Not all of the commands, however, are that complicated. For instance the "CLS" command just looks like this:

```
call CLS
```

In this case CLS is just a routine found in the 2068 ROM.

String handling is easier to do than one might think. Consider the following expression:

```
LET A$(K)=B$(L)
```

Which in assembly language is...

```
ld hl,B$ loc
ex de,hl
ld hl,(L loc)
add hl,de
ld a,(hl)
```

This is just the first part that gets the character into the register "a". Only "B\$(L)" has been evaluated so far. Now for the second part which will put the character into "A\$(K)"...

```
ld hl,A$ loc
ex de,hl
ld hl,(K loc)
add hl,de
ld (hl),a
```

It should be evident that the compiler has a great many things to keep track of here. In order to create the above instructions, it must know the location of A\$, B\$, K, and L.

The above are just a few examples from a very complex instruction set. Most of the compiler commands such as "PRINT" use the 2068 operating system but still have the same simple pattern of expressions first - instructions last.

If you have never used machine code before, but can understand the above examples, then you are well on your way to creating machine code programs.

If you already know how to use machine code then maybe the above will serve as example of how machine code can be used to imitate BASIC.

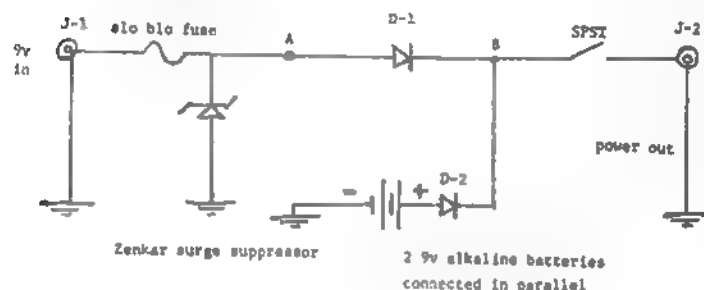
John Coffey

JRC's Integer BASIC Compiler/Assembler is available for \$24.95 from JRC, P.O.Box 448, Scottsburg, IN 47170.

REVIEWS FOR THE NON PROGRAMMER  
A.GINDIN

I've been struck by lightning and in spite of Zenkar's diode (see ad) a fuse, a circuit breaker and a grounded outlet, I blew a chip. I think it was the SCL (part of it worked), which brings me to the subject the proper power supply.

I presently use:

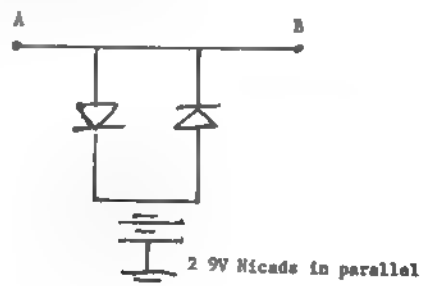


Modified from SYNC 3/4 '81

J1 and J2 are phone jacks; J2 is on the end of a 6" shielded cable to go into the computer. D 1 and D 2 are diodes "at least 50 PIV, 1A." Two connectors needed for the 9v batteries. Cabinet to hold all. I taped the batteries to the base. Pick an SPST to your liking and cut a hole to suit. All from Radio Shack.

Les Solomon of Computers & Electronics uses a Polaroid film pack battery and 2 IN4001 Diodes. He uses clips for the batteries as they are hard to solder to.

For 9 V Nicads Zenkar suggests the following: (I have not tried this).



He calculates this will only give 7.6 volts which might not be enough for LOAD/SAVE. This may make the project useless for power failures of more than a few minutes.

As noted by Zenkar the first plan only supplies enough current for 20 minutes. This is long enough to get over a brief power loss and also long enough to get the memory to tape (you won't have a screen). If you're going to need enough power to keep your monitor and disc going you might as well get a gasoline generator and have enough for your frig as well.

- Imagine, someone read this column and wrote a letter! (TS Horizons-5) Thank you. Yes, the VUCALC won't work with the Memotech interface unless someone can disassemble it and replace all the graphics with another symbol e.g. "\$" or simply leave them out as Memotech does. Someone in our users' group is working on this.

- As noted before I am trying to select a group of quality programs for a home office with a T/S 1000 and an 80 column printer. The Memocalc has been described before and I feel is the best spread sheet available. Likewise, the ZX ProFile data base. Another program I like because it keeps the screen busy when nothing needs to be done is a digital clock. (SYNC 3 No. 4, 83). The same article also contains an analog clock and a calendar, if you wish one. This program only requires you enter the time (24 hr.) at the prompt. It can also be adjusted if your oscillator is off. Add line: 705 SLOW. Line 140 allows you to fine tune the clock. Time the clock for one hour. Then, if it is fast by 7 seconds, e.g., add 7 to the pause value. This would seem to be a good program to put into the 9-16 K NVM of Hunter, but I don't know how. The letters fill the screen and it would also be nice to call the time up into a corner of the screen with a USR call but again I leave that for a real programmer.

- Speaking of time there is a calendar program available called Memo Calendar from

Simulision, Box 894, Lemon Grove, California 92045. This gives you a permanent calendar for this century. If you have an appointment for a particular day, that day appears on the monthly calendar with an inverse number. You then call the schedule for the day and you can store a screen of reminders. If you add "406 ENTER" the calendar will print out without the graphics. (Info supplied by seller). The day's appointments can also be copied by a single command. Interestingly there is a program for the IBM PC which combines the clock and calendar and adds reminders all for about \$40.00. More good programs to come. Let me know if you need something special.

- By now many of you have probably bought ZX Pro-File by Tom Woods. You can buy it direct Box 64, Jefferson, NH 03583. The only problem I have had with it is that it occasionally won't let me edit an entry. In case you still doubt how good it is I refer you to an article by music critic Allan Kozinn in High Fidelity, February, 1984. In effect he discards "Perfect Filer" because of features which are better done on ZX Pro-File: problems in retrieval. He settles on dBASE II, a \$700 program!

T-SH

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Games for Your Timex-Sinclair 2000  
Dell Publishing Company, Inc., 1983  
124 pp., softcover, \$5.95

REVIEWER: Bill Ferrebee

Games for Your Timex-Sinclair 2000 by Peter Shaw is a collection of 23 games that utilize both the sound and the high-resolution graphic capabilities of the Timex computer. Even if you aren't a "video Junkie", some of the programming techniques used by Shaw are worth looking into for use in other programs.

Shaw has successfully translated some favorite arcade games (sorry, no "Pac-Man") for the Timex computer. "Frogger", "Lunar Lander", and "Death Race 2000" come to mind as I look through the table of contents for this book.

Through the use of UDGs (User-Defined Graphics), the games take on a very realistic look; not the blurry blobs we have been accustomed to in many other home computer games.

I do have a few suggestions on how to make entering the listings in this book easier and more enjoyable. First, type in the lines from 9000 to the end of the program you are entering, and RUN them. This generates the UDGs described above for that particular program. Then enter the remainder of the program.

Next, since the Timex-Sinclair has built-in joystick ports, why not use them? By replacing the INKEY\$ commands with appropriate STICK commands, the playability of each game improves greatly. The User Manual included with the computer details the STICK command very well.

T-SH

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## 2068 SOFTWARE REVIEW

by Tex Faucette

THE GREAT GRAPHICS SHOW  
(C) 1984 by JRC SOFTWARE, P.O. Box 448,  
Scottsburg, IN 47170

THE GREAT GRAPHICS SHOW is Just that. There are 18 menu selectable routines which Provide such items as a simulated oscilloscope with a slowly rotating "Lazy Joe" Pattern Plus the option to display other Patterns by operator input. The most spectacular routines are those which display various forms of graphs. Game routines include a touch-typing game, Lunar Lander, animation demo, and dodge'em. The menu also contains a COPY routine which will capture the graphic displays on the Timex Printer.

THE GREAT GRAPHICS SHOW also contains an additional "hidden" routine called "Something Different". See if you can find it! Programs are available separately for \$9.95 each, or all together on a longer tape which includes "EASY EDITOR" for \$24.95.

EASY EDITOR uses the somewhat novel idea of Placing text in numbered REM statements, and using the T/S 2068s built-in editing commands. Instructions for use are contained in the Program, along with the JRC Software Catalog, and the "JRC Magazine". I took the liberty of editing down to the basic Program before trying to input, edit, and Print text.

The EASY EDITOR instructions also contain copying instructions, and a rather unusual "authorization" to make one copy, for which JRC will Provide official labels on request. The instructions suggest that each REM contain a Paragraph not exceeding 10 lines. Nothing drastic occurs if this limitation is not observed, but longer Paragraphs do slow down the cursor movement when editing. Text may be "formatted" (which means no word splitting), but there is no Provision for right Justification. Printout of "formatted" text is rather slow, due to what I assume to be "formatting Pauses" between Paragraphs.

Although EASY EDITOR has a good text capability, it is not really the Program for one who Produces a large text output and requires more stringent formatting capability.

All Programs may be "LListed" to the text Printer, but I warn you to check paper supply first- THE GREAT GRAPHICS SHOW is truly massive!

These graphs  
text using  
Show by



## GAME REVIEW, T/S 2068

by Tex Faucette

"BUGABOO" Copyright 1984 by Quicksilver  
(TM) The Game Lords of Britain, 426  
West Nakoma, San Antonio, TX 78216

First, one must accept the concept that  
a flea is worth saving.

If the Philosophical connotations can  
be resolved into a Positive decision,  
one can then enjoy the challenge of  
assisting poor "Bugaboo the Flea" in  
his attempts to to escape from the  
perilous environment into which he has  
fallen.

Not only do strange, exotic Plants  
abound which sap his strength and  
inhibit his frantic leaps for safety,  
there is also a ravenous flea-eating  
Pterodactyl roaming the caverns and  
ledges in search of a flea lunch!

All the assistance one can offer this  
unfortunate flea is to provide the  
direction and timing of his frantic  
leaps, and keep a wary eye out for the  
fearsome Pterodactyl. This terrible  
Pre-historic beast can Penetrate all  
but the most sheltered locations, and  
is quite adept at airborne  
interception!

Quicksilver, Inc. has again selected a  
fast action game with excellent use of  
the Graphics capabilities of the Timex  
Sinclair 2068. A real challenge exists;  
"Bugaboos" escape is not easy to  
achieve.

Quicksilver also provides Games for the  
Commodore 64, and is now the U.S.  
representative for Virgin Games. Future  
Plans include Programs for Acorn,  
Apple, Atari, Memotech MTX, Sinclair  
QL, and PC Jr.

A recent communication with the  
President of Quicksilver, Inc. indicates  
that if any of the many rumors of the  
revival of the 2068 Prove true,  
Quicksilver will also continue to expand  
their line of software for that  
machine.

## BOOK REVIEW

by Tex Faucette

THE WORKING TIMEX SINCLAIR 2068  
by David Lawrence

Copyright 1984 by David Lawrence

Creative Computing Press, 39 East  
Hanover Avenue, Morris Plains, NJ 07950

"The Working Timex Sinclair 2068" is a  
very commendable effort to supply the  
2068 user with a "library" of useful  
Programs. Each of the six chapters  
covers a different area of usage. A  
rather unique index references module  
numbers rather than page numbers, as  
all the Programs are in the "modular"  
style.

Chapter 1 contains "UNIFILE" for  
handling records with a regular  
structure. Chapter 2 contains three  
financial Programs, "BUDGET",  
"ACCOUNTANT", and "BANKER". Chapter 3  
is on the subject of Graphics,  
containing five Programs which allow  
one to define characters and store them  
in a "dictionary", create and store  
pictures, an "ancient Chinese" game,  
and a design Program that allows one to  
view their creations in various scales  
and to rotate all or part of the  
designs on the screen. Chapter 4  
contains three educational Programs.  
Chapter 5 is a collection of  
"utilities" which include a line  
renumber and an advanced modification  
of the "Unifile" Program from Chapter  
1. Chapter 6 is devoted to "fun and  
games".

The "Modular Concept" as used in this  
174 page volume serves as an excellent  
method for learning the capabilities of  
the T/S 2068. Each module is  
accompanied by a narrative explanation  
as well as comments concerning specific  
lines, and most modules can be tested  
individually upon completion.

For the Purpose of this review, I have  
entered and used the character defining  
module from Chapter 3. It allows one to  
design characters on a 2x2 block. The  
Program defines the initial character  
as an "outlined space", which is then  
used to draw the "Pixel grid" upon  
which other characters are defined  
under cursor control. This module works  
very well, and is capable of producing  
just about any figure one can imagine.

"The Working Timex Sinclair 2068" is  
highly recommended both as a tutorial  
and a source of useful Programs.

## CHRISTIAN SOFTWARE

### Bible Story Software for T/S 1000

David & Goliath 12.95  
The Ark 12.95  
\$1.50 shipping & handling  
others available - send for free flyer  
Box 547, Bettaville, Ohio 44815  
1-419-966-5217

Matthew  
5:16



Programming Your Timex/Sinclair  
1000 in BASIC

By: Mario Eisenbacher  
Prentice-Hall, Inc.  
189 pp. (softcover)

This book is so understandably written and logically organized that it should have been included in the Timex 1000 package. For those like me, who found the User Manual too often abstruse and lacking in detail, Mr. Eisenbacher has provided a veritable Rosetta Stone.

Each chapter ends with a summary of the new words and concepts presented in that chapter, as well as some test questions (with the answers and explanations thoughtfully provided in an appendix) to help the reader assess his own comprehension of the material. Also included at the end of each chapter are so-called "interest stimulator" programs that bait the reader's curiosity about Sinclair BASIC capabilities to be explained in the next chapter.

Programming techniques are assigned one of seven levels of ability, beginning with fundamental PRINT characteristics. Using appropriate commands, statements, etc., Mr. Eisenbacher designs a series of short programs that effectively illustrate his lessons. By including mistakes and oversights common to the novice programmer, he is able to explain why the errors occurred, as well as the methods to correct them. This helpful practice is followed throughout most of the book.

The second chapter introduces flowcharts, loops, and CHR\$ and CODE usages. Level three delves into terminology and software and includes a good description of the system's storage capabilities. Chapters Four and Five, while presenting a lot of information, manage to be readable and enlightening explanations of the Timex's facility with arrays and complex logical operator decisions. Chapter Six contains programs that illustrate the PEEK function and the POKE

command, and although it never gets around to USR or machine language tutorial, there are seven educational game programs using all the techniques acquired in the first five programming chapters. Level seven give the reader some practical applications in sorting, alphabetizing, and interest-type computations.

Though written primarily for the beginner, this book is full of useful and helpful programs, along with thorough explanations, and -- the two glaring typos on the back cover notwithstanding -- Mr. Eisenbacher's step-by-step, trial-error-explanation-correction methods of instruction should make this book a most welcome addition to any computer owner's reference library.

By: Robert Farley

More Uses For Your Timex/Sinclair  
1000: Astronomy on Your Computer

By: Eric Burgess  
and Howard Burgess  
Sybex, 153 pp. (softcover)

The Burgesses have gathered twenty wonderfully elaborate programs and rewritten most of them for Sinclair 16K BASIC. The programs, divided among the four general categories of time, the planets, the moons, and general tutorial, are all available on tape from the authors, without whose permission storage of the programs is illegal.

Some of the astronomically eloquent programs include sidereal and Julian day conversions; moon and planet positions in the sky; horizon plots for any date, time, and location showing what is where in the sky; and a constellation recognition tutorial. There is even a program dedicated to planetary photographers that calculates, among other things, exposure times for different film speeds, shutter openings, and methods of photography; however, for detailed treatments of the subjects and necessary revisions of some programs, the authors repeatedly refer the reader to Eric Burgess's Sybex book, Celestial BASIC.

By Robert Farley

# "W O R M"

## word processor

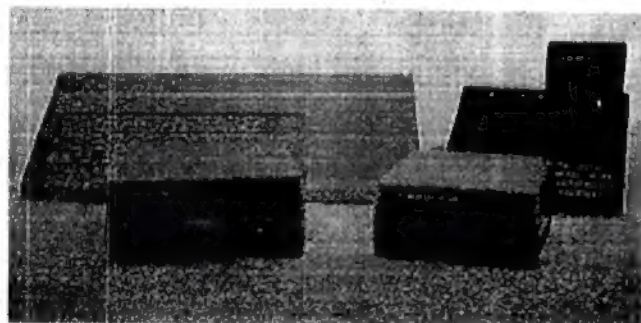
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**H & Z ELECTRONICS  
P.O. BOX 8761  
MADISON, WI 53708**

H & Z ELECTRONICS THE BATTERY BACK-UP SPECIALISTS  
OFFER MANY FEATURES NOT FOUND IN SIMILAR UNITS

Power Saver 1000-2000 is the state of the art in solid state design, in which numerous production models have been designed, built and tested. In respect we came up with a memory saving computer aid that allows fully operational computing when AC fails to operate the computer properly. The P/S1000 is fully incased with the highest quality rechargeable batteries available to meet the demands of your computer. Once discharged the batteries can be recharged in either one of two positions explained in further detail:

#### CHARGING:

Due to the unique design of the P/S1000-P/S2000 it allows you the choice of a "Fast" or "Slow" (trickle) charge position.

**SLOW** - With the P/S1000-P/S2000 in the slow position the user has full use of all of the computers functions, along with it capability of retaining memory when AC fails to run the computer properly. In this position the batteries are trickle charged as needed to keep them in peak operation conditions without affecting the operation of the computer in any way.

**FAST** - This position has been built in for those of you who may wish to make your computer portable. In the fast charge position it allows you to restore the necessary charge to the batteries overnight (approx. 6 to 10 hours from minimum operating point). However, in this position it is not possible to run the computer due to the fact that all of the supplies power is delivered into charging the batteries.

\*(NOTE: Due to the self regulation of the P/S1000 it is not possible to overcharge the batteries in either the fast or slow charge position)

#### LED BATTERY TEST:

The P/S1000-P/S2000 has a built in battery test feature that you will find quite unique and helpful. It is extremely easy to operate by depressing the push button switch on the P/S1000-P/S2000 labeled "Battery Test". It will indicate the batteries capabilities. If the LED lights brightly there is enough of a charge to operate the computer. The LED will consistently dim with the capabilities of the batteries to run the computer properly. When the LED does not light, it simply means the batteries are undercharged and are not reliable to run the computer.

#### WARRANTY:

The P/S1000-P/S2000 is guaranteed to be free of defects due to workmanship and components for 90 days from the date of shipment. If necessary, the P/S1000-P/S2000 may be shipped to us for repairs. If out of warranty - repairs will be made at a minimal cost.

Due to manufacturing changes - charge rates may vary slightly.

#### SPECIFICATIONS:

T/S1000: APPROX. 3-1/2 Hours of Battery Life With T/S1016  
APPROX. 7 Hours of Battery Life Without T/S1016  
T/S2000: APPROX. 7 Hours of Battery Life With T/S2068



# 21st CENTURY ELECTRONICS

6813 POLK STREET

GUTTENBERG, N.J. 07093

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MSCRIP T



AVAILABLE

JUNE 22

## 21st CENTURY ELECTRONICS presents MSCRIPT

This is the program that will bring out the power of your TIMEX/2068. MSCRIPT is a word processor, which has the capabilities only found in the best word processing programs costing many times the price of MSCRIPT. A seventy page manual is included to lead you thru the world of wordprocessing, even if you have had no previous experience in the use of this type of program. A screen command and function menu, is at your finger tips at all times. Delete, insert, string search, block move, printer formatting, are just a few of the functions available to you. There are even ten user definable functions. The manual also gives you an intro on how to use this program as a DATA BASE. MSCRIPT is the type of program whereby the more you use it, the more uses you will find for it. MSCRIPT was developed to operate with the centronics interface being marketed by 21st CENTURY ELECTRONICS and AERCO.

### SUPER VALUE COMPLETE WORD PROCESSING PACKAGE includes

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- 3) \* MSCRIPT \* wordprocessing program

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